JAPAN

EDICT OF GOVERNMENT

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JIS B 9713-1 (2004) (English): Safety of machinery -- Permanent means of access to machinery -- Part 1: Choice of a fixed means of access between two levels

ISO INSIDE

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The citizens of a nation must honor the laws of the land.

Fukuzawa Yukichi

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JIS

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
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JIS B 9713-1 : 2004

(ISO 14122-1 : 2001)

(JMF)

Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels

ICS 13.110

Reference number : JIS B 9713-1 : 2004 (E)

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Health, Labour and Welfare and the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from The Japan Machinery Federation (JMF)/the Japanese Standards Association (JSA), with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

This Standard has been made based on **ISO 14122-1**:2001 *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Ministers and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

JIS B 9713 consists of the following parts, under the general title of "*Safety of machinery — Permanent means of access to machinery*":

Part 1: Choice of fixed means of access between two levels
Part 2: Working platforms and walkways
Part 3: Stairs, stepladders and guard-rails
Part 4: Fixed ladders.

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In the event of any doubts arising as to the contents, the original JIS is to be the final authority.

Contents

JAPANESE INDUSTRIAL STANDARD

JIS B 9713-1 : 2004
(ISO 14122-1 : 2001)

Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 14122-1** *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels* published in 2001 with modifying the technical contents.

The foreword of the original International Standard has been excluded because it is not part of the provisions.

This part of **JIS B 9713** is a group safety standard and Part 1 of the series of standards in **JIS B 9713**.

The provisions of this document may be supplemented or modified by a product safety standard.

NOTES 1 For machines which are covered by the scope of a product safety standard and which have been designed and built according to the provisions of that standard, the provisions of that product safety standard take precedence over the provisions of this group safety standard.

2 This Standard requires the manufacturers to provide "safe access to production, servicing points and maintenance working area" and to prevent "risk of slipping, tripping or falling".

3 See also relevant matters described in **6.2.4** "Provision for safe access to machinery" of **ISO 12100-2**.

4 The use of materials other than metals (wood composite materials, so-called "advanced" materials, etc.) does not alter the application of this part of **JIS B 9713**.

Information : **JIS Z 8051**:2004 sets up the "hierarchy" of safety standards as follows:

- *basic safety standard*, comprising fundamental concepts, principles and requirements with regard to general safety aspects applicable to a wide range of products, processes and services;
- *group safety standard*, comprising safety aspects applicable to several or a family of similar products, processes or services dealt with by more than one committee, making reference, as far as possible, to basic safety standards;
- *product safety standard*, comprising safety aspect(s) for a specific, or a family of, product(s), process(es) or service(s) within the scope of a single committee, making reference, as far as possible, to basic safety standards and group safety standards;

This part of **JIS B 9713** defines the general requirements for safe access to machines mentioned in **ISO 12100-2**. It gives advice about the correct choice of access means when the necessary access to the machine is not possible directly from the ground level or from a floor.

1 **Scope** This part of **JIS B 9713** applies to all machinery (stationary and mobile) where fixed means of access are necessary.

This part of **JIS B 9713** applies to means of access which are a part of a machine.

This part of **JIS B 9713** may also apply to means of access to that part of the building (e.g. working platforms, walkways, ladders) where the machine is installed, providing the main function of that part of the building is to provide a means of access to the machine.

NOTES 1 This part of **JIS B 9713** may be used also for means of access which are outside the scope of this part of **JIS B 9713**. In those cases the possible relevant national or other regulations should take precedence.

This part of **JIS B 9713** applies also to access means specific to the machine which are not permanently fixed to the machine and which may be removed or moved to the side for some operations of the machine (e.g. changing tools in a large press).

This part of **JIS B 9713** does not apply to lifts, to moveable elevating platforms or other devices specially designed to lift persons between two levels.

2 The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

ISO 14122-1 : 2001 *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels* (IDT)

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 9702 *Safety of machinery — Principles of risk assessment*

NOTE : **ISO 14121**:1999 *Safety of machinery — Principles of risk assessment* is identical with the said standard.

JIS B 9713-2 *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways*

NOTE : **ISO 14122-2**:2001 *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways* is identical with the said standard.

JIS B 9713-3 *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails*

NOTE : **ISO 14122-3**:2001 *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails* is identical with the said standard.

JIS B 9713-4 *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders*

NOTE : **ISO 14122-4**:2001 *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders* is identical with the said standard.

ISO 12100-1 *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 12100-2 *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

3 Terms and definitions For the purposes of this part of **JIS B 9713**, the following definitions apply (see also figure 5).

Information : See **EN 1070** for the terms and definitions relevant to this part of **JIS B 9713**.

3.1 ladder fixed means of access with an angle of pitch from more than 75° to 90°, whose horizontal elements are rungs (see figure 1)

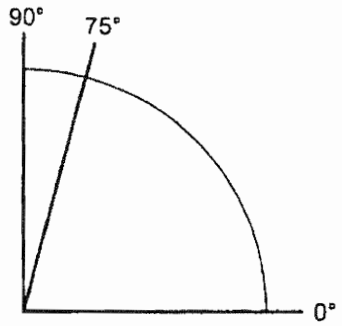


Figure 1 75° < angle of pitch ≦ 90°

3.2 stepladder fixed means of access with an angle of pitch from more than 45° up to 75°, whose horizontal elements are steps (see figure 2)

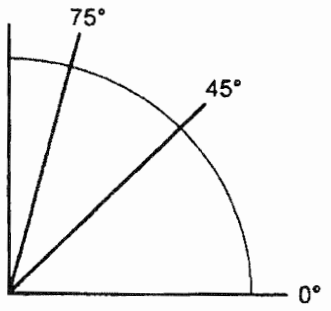


Figure 2 45° < slope angle ≦ 75°

3.3 stair fixed means of access with an angle of pitch from more than 20° up to 45°, whose horizontal elements are steps (see figure 3)

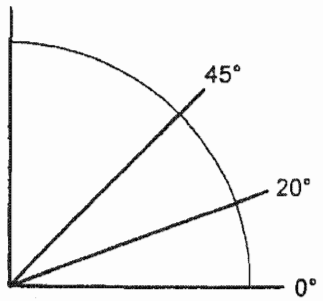


Figure 3 20° < angle of pitch ≦ 45°

3.4 ramp fixed means of access, comprising a continuous inclined plane having an angle of pitch from more than 0° up to 20° (see figure 4)

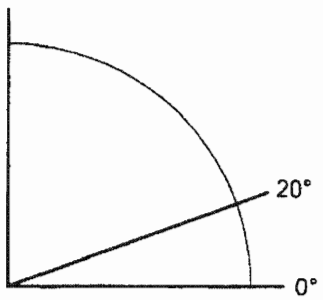


Figure 4 0° < angle of pitch ≦ 20°

4 Significant hazards The significant hazards to be considered when determining the type and location of the means of access are the following:

a) Falling

b) Slipping

c) Tripping

d) caused by excessive physical effort, e.g. from climbing a series of ladders

e) from falling of materials or objects when they may cause a risk to persons

Other hazards generated by the machinery, e.g. caused by the functioning of the machinery [moving parts of the machine, movement of the machine itself (mobile machines), radiation, hot surface, noise, steam, hot liquids] or caused by its environment (harmful airborne substances) are not covered by this part of **JIS B 9713** but the designer of the machine should consider them, e.g. by preventing the access.

NOTE : **JIS B 9702** gives principles for risk assessment.

This part of **JIS B 9713** is primarily aimed at the prevention of persons falling and of excessive physical efforts.

5 Requirements for the selection of the fixed means of access

5.1 General There shall be a safe and convenient means of access to all the zones and points of the machine where the need for access can be foreseen during the phases of the "life" of the machinery (see **3.11** of **ISO 12100-1**).

5.2 Preferred means of access The preferred means of access to the machinery shall be in the following order:

a) access directly from the ground level or from a floor, (for more details see **5.3.1.1** and **JIS B 9713-2**);

b) lifts, ramps or stairs, (for more details see **5.4**);

c) stepladders or ladders, (for more details see **5.5**).

5.3 Selection of the means of access

5.3.1 Basic solutions

5.3.1.1 Whenever possible, access to control devices and other parts of the machine is preferred from either a ground level or a floor. This is particularly important where frequent access is required.

5.3.1.2 If level access according to **5.3.1.1** is not possible or practicable,

– a lift

or

– suitable ramp with an angle of pitch less than 10° [see **5.4 b)**]

or

– stairs with an angle of pitch from a minimum of 30° to maximum of 38° [see **5.4 c)**]

shall normally be selected as a safe and suitable basic solution for the necessary access.

5.3.2 Conditions for the selection of stepladder or ladder

5.3.2.1 In the design of access to machinery, stepladders and ladders shall be avoided as far as practicable due to the higher risk of falling and because of the higher physical efforts when using these access means.

5.3.2.2 If access means according to **5.3.1** are not possible, selection of a stepladder or ladder may be considered. The final decision shall be made on the basis of the risk assessment, including ergonomic aspects.

If the level of risk (see **JIS B 9702**) is considered to be too high, the basic construction of the means of access to the machine shall be changed to allow accessways with a reduced risk to be used (see **5.3.1** and annex A).

5.3.2.3 The following list presents some examples of the cases when a stepladder or ladder may be selected. These are only examples - the final selection shall always be done case by case on the basis of risk assessment. In most cases more than one of the conditions in the following list shall be fulfilled to make the selection of a stepladder or ladder possible.

a) Short vertical distance.

b) The means of access is foreseen to be used infrequently.

NOTE : When estimating the frequency of the use, the whole life of the machinery is considered. If the means of access is to be used frequently, e.g. during the assembly or installation of the machine or during periodical major maintenance tasks, a stepladder or ladder is not an adequate solution.

c) The user will not be carrying any large tools or any other equipment when using the means of access.

d) Only one user will be foreseen to use the means of access at the same time.

e) The means of access is not foreseen to be used for evacuation purposes by injured persons.

f) The structure of the machine does not make stairs or other basic means (see **5.3.1**) possible.

NOTE : Examples are a tower crane and mobile machines.

5.3.2.4 For the choice between stepladder and ladder see **5.5**.

5.4 Choice among lift, ramp or stair The installation of a stair or ramp as means of access between two levels is always preferable to that of a stepladder or ladder.

When selecting either a lift, ramp or stair, the following points shall be considered.

a) A lift may be the best solution in the following cases;

- need for frequent access of several persons;
- long vertical distances;
- heavy loads to transport;

An alternative escape route is always needed in addition to a lift.

b) A ramp may be the best solution in the following cases;

- for a short vertical distance;
- where it is necessary to transport wheeled vehicles [forklifts (trucks), manually moved carts, etc].

Different angles of the ramp are depending on the use:

- for hand carts or other manually transported wheeled vehicles, maximum angle 3° (particularly when likely to be used by handicapped persons):
- for motor vehicles [e.g. forklift (truck)], maximum angle 7°;
- for walking, up to 20° (generally and preferably not more than 10°).

NOTES 1 Ramps are often preferable to stairs with only one or two steps.

2 The properties of the surface have very strong influence on the safety of the ramp. The surface should have very good resistance against slipping in particular for ramps between 10° and 20°.

c) Stairs (for detailed requirements see **JIS B 9713-3**).

Preferred angle of pitch is between 30° and 38°.

5.5 Selection between stepladder and ladder When making the selection between stepladder and ladder at least the following points **a)** and **b)** shall be considered. For the detailed requirements of these means of access, see **JIS B 9713-4** and **JIS B 9713-3**.

a) Consequences on the level of safety affected by the choice of stepladders;

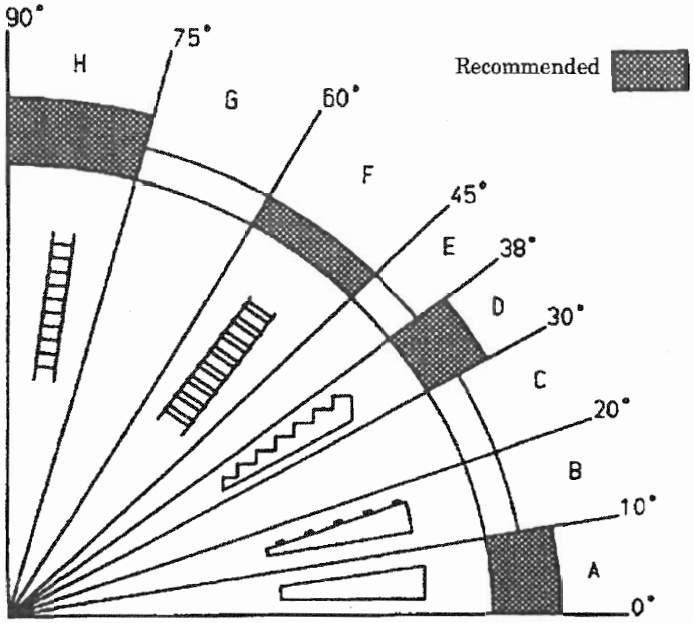
- if a person is coming down the stepladder and not facing it, there could be an increased risk of falling;
- if a person is using the stepladder whilst carrying small objects, there could be an increased risk of falling;
- according to **JIS B 9713-3**, the maximum flight of a stepladder without a rest platform is limited;
- stepladders with an angle of pitch between 60° and 75° should only be selected due to space limits or process requirements.

b) Consequences on the level of safety affected by the choice of ladders;

- the person needs to face the ladder and also to use his hands for holding. Therefore, it is considered highly unlikely that the user will descent facing away from the ladder;
- ladders are physically harder to use;
- according to **JIS B 9713-4**, the maximum flight of ladders without a rest platform is limited;
- Two main alternatives for protection of the users of fixed ladders against falls from a height are safety cages or fall arresters:
  - The cage shall be the required choice, as it is a means which is always present and the actual level of safety is independent of the operator's actions,
  - Where it is not possible to use a cage, individual protective equipment shall be provided. The fall arrester is only effective if the user chooses to use it. If a harness with an incompatible sliding system is used with a guided type fall arrester, there will be a risk.

  A fall arrester shall be designed only for low frequency and specialised access (e.g. maintenance).

NOTE : An appropriate individual fall protection device is able to arrest a fall better than a cage.



Key

A Ramp (recommended)
B Ramp with enhanced slip resistance
C Stair
D Stair (recommended)
E Stair
F Stepladder (recommended)
G Stepladder
H Ladder (recommended)

Figure 5 Range of the various means of access

6 Assembly instructions All information on the proper assembly shall be contained in the assembly instructions. In particular, information shall be included on the:

- method of fixing;
- assembly of guided fall arrester on anchorage point, where applicable.

Annex A (informative) Examples of the changes in the machine or system to make better access possible

This annex is to supplement the matters related to the text and not to constitute the provisions of this Standard.

A.1 Make changes in the position of pillars, beams, pipelines, cable trays, platforms, storage tanks, etc., to make the use of the stairs designed in accordance with this part of **JIS B 9713** or other preferable access means possible.

A.2 Make changes in the design of the means of access (e.g. location) to make stairs designed in accordance with this part of **JIS B 9713** or other preferable means of access possible.

EXAMPLE 1 Make the access from another side so that there is enough room for stairs designed in accordance with this part of **JIS B 9713**. Add horizontal platforms if necessary.

EXAMPLE 2 Make changes in the design of the means of access so that stairs are possible (e.g. change in the direction).

A.3 Make changes in the machine to remove the need for access or to make the access possible from the ground level or from a floor.

EXAMPLE 1 Position lubrication points near the ground level with the help of pipes.

EXAMPLE 2 Use a different method of lubrication, e.g.

- permanent lubrication (oilless);
- lubrication circuit with a pump.

EXAMPLE 3 Motor and power transmission means positioned so that access to the maintenance and servicing points is possible from the ground level.

EXAMPLE 4 The machine is installed to another place so that access is possible e.g. from an already existing platform.

EXAMPLE 5 Change the position of pipelines and/or valves so that operation of the valve is possible from the ground level or the floor.

Annex B (informative) Bibliography

This annex is to supplement the matters related to the text and not to constitute the provisions of this part of **JIS B 9713**.

In compiling this part of **JIS B 9713**, the following have been taken into account:

JIS B 9707 *Safety of machinery — Safety distances to prevent danger zones being reached by the upper limbs*

JIS B 9708 *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs*

JIS B 9711 *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 131-2:1993 *Ladders — Requirements, Tests, Markings*

EN 353-1 *Personal protective equipment against falls from a height — Guided type fall arresters on a rigid anchorage line*

EN 364 *Personal protective equipment against falls from a height — Test methods*

EN 547-1 *Safety of machinery — Human body dimensions — Part 1: Principles for determining the dimensions required for openings for whole body access into machinery*

EN 547-2 *Safety of machinery — Human body dimensions — Part 2: Principles for determining the dimensions required for access openings*

EN 547-3 *Safety of machinery — Human body dimensions — Part 3: Anthropometric data*

EN 795 *Protection against falls from a height — Anchorage devices — Requirements and testing*

EN 1070 *Safety of machinery — Terminology*

Errata for JIS (English edition) are printed in *Standardization Journal*, published monthly by the Japanese Standards Association, and also provided to subscribers of JIS (English edition) in *Monthly Information*.

Errata will be provided upon request, please contact:

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